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UTILIZATION OF NASA-GENERATED SPACE TECHNOLOGY BY
MIDWESTERN INDUSTRY

QUARTERLY PROGRESS REPORT NO. 2
5 February - 5 May 1962

Task Order Contract No. NASr-63(03)

M.R.I. Project No. 2563-M

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Washington 25, D. C.



MIDWEST RESEARCH INSTITUTE

M I D W E S T R E S E A R C H I N S T I T U T E

UTILIZATION OF NASA-GENERATED SPACE TECHNOLOGY BY
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by

H. M. Gadberry

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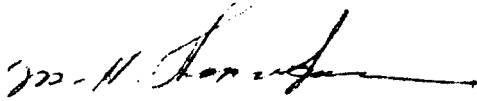
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PREFACE

This Quarterly Progress Report covers project activity from 5 February 1962 through 5 May 1962. The report was prepared by the project leader, H. M. Gadberry.

Approved for:

MIDWEST RESEARCH INSTITUTE

A handwritten signature in dark ink, appearing to read "M. H. Thornton", with a long horizontal flourish extending to the right.

M. H. Thornton
Vice President and
Technical Director

22 June 1962

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I. INTRODUCTION

This report covers the second three months' effort, from 5 February to 5 May 1962, on Contract NASr-63(03).

Work during the first quarter (5 November - 5 February) was devoted primarily toward gathering from NASA sources, space-oriented ideas that have industrial applications. The first task was to identify the useful "products" we intended to distribute. Originally, we were concerned that too few useful space-related concepts would be available to permit our carrying on an effective applications program; by the end of the first quarter, this concern had disappeared. We had collected enough useful ideas to permit turning our attention to the dissemination phase of the project.

II. PROJECT STATUS

At the beginning of this second quarter, we made our first contact with industry; toward the end of the period manufacturers reported the first successful uses of the ideas we have provided.

The main effort since March has been in "marketing" industrially useful ideas, and in appraising the reactions of the firms contacted. In order to get the dissemination effort under way, the ASTRA* program was introduced to more than 1,500 people throughout the six-state region (Missouri, Kansas, Oklahoma, Arkansas, Nebraska and Iowa).

We have requested, received and analyzed data provided by each industrial firm to determine its main areas of technical interest, its degree of technical capability and management sophistication, and its awareness of the potential benefits that the Space Program can offer.

Specific requests from area manufacturers for more information about 125 items have been answered. As follow-up, we have visited with 34 firms to see whether their needs can be satisfied by new developments in space-oriented technology, and to adapt these ideas to their specific needs.

A systematic analysis of NASA reports has now been started. This work was delayed until the new NASA documentation program could get under way.

* The acronym ASTRA (Applied Space Technology = Regional Advancement) was selected as a name for all project activities concerned with regional industrial services.

From the first few issues of NASA's new Technical Publications Announcements, Volume II, we clearly see that the documents now abstracted represent a valuable source of industrially useful technology. We must now devote much more effort to the assessment of reports from NASA contractors and related works by other government agencies.

During this quarter, information on space-related developments has been assembled for a newsletter which will soon be issued periodically to all participating firms. Each issue will stress potential applications, and inquiries for further information will be individually followed up. General mailings are to be supplemented by specific technical summaries distributed on a selective basis.

Strong interest in NASA's inventions and patents have been displayed by manufacturers who foresee possible profitable applications in the near future. This was demonstrated by their reaction to only a few of NASA's more than 800 case records. A joint effort by NASA and Midwest Research Institute in making a complete review of these invention records is clearly needed as soon as possible and will be very valuable to our industrial audience.

Based upon having sampled approximately one-half of our intended audience, we have formed some tentative conclusions about how to improve our dissemination program. We have decided that our major effort should be on "selling" ideas. During the months ahead, the persuasion of manufacturers to adopt new ideas is our biggest concern and toughest problem. We intend to emphasize personal contacts and an informal flexible approach.

III. MEETINGS TO INAUGURATE THE ASTRA PROGRAM

1. Meetings: A series of half-day meetings were held in Omaha, Des Moines, Oklahoma City, Joplin, Wichita and Kansas City, for the purpose of introducing the ASTRA program to industry and regional leaders. These meetings were attended by people representing 241 firms which are potential users of technical ideas and 106 organizations concerned with the economic development of their area. Appendix A further analyzes the attendance at each meeting. Other presentations were made to the Economic Club of Oklahoma, the annual meetings of the Missouri and Kansas Bankers Associations, and the Annual Meeting of the Trustees of Midwest Research Institute.

In these meetings we stressed NASA's intention to make available technical information from the Space Program and to stimulate its use in practical commercial applications.

To emphasize both the broad range of ideas available, and the opportunities to use these ideas commercially, we used a large number of examples illustrated by slides and models. Each ASTRA speaker indicated the connection of the ideas to the Space Program and stressed the possible uses of the ideas in new practical applications.

A number of NASA representatives attended most of these meetings and offered many valuable suggestions to increase the effectiveness of the presentation. We recommend that the applications people from each NASA center try to attend one of the future meetings which will be scheduled this fall.

2. Exhibits: To lend greater substance to the message at these initial meetings, a series of explanatory displays and exhibits were assembled. The accompanying photographs show the exhibits being examined by industrialists in Des Moines, Iowa. From the reaction of the audience, we feel that these physical displays did much to bring the project objectives home to the viewer as a practical reality rather than an intangible and remote possibility.

3. Inquiries: At each meeting the speakers described about 30 ideas, using slides or actual items where possible. The ideas were chosen to cover many fields of interest, and little time could be devoted to each concept.

Following the meetings we received inquiries for further details about the space-related ideas which were presented in highlight fashion. A total of 95 requests was received from 46 companies. The distribution of these requests is given below.

INQUIRIES FOR MORE INFORMATION

(A total of 95 requests was received from 46 firms)

<u>Number</u>	<u>Subject</u>
14	F.E.P. release coatings
7	Sintered alumina ceramics
6	Printed cables
5	Air bearings
5	2 component spray gun nozzles
4	Cold galvanized paints
4	Nucleated glass (Pyroceram-Nucerite)
4	NRC-2 aluminized Mylar insulation
4	Reliable soldering techniques
4	Rechargeable sealed batteries
3	PERT and PERT-COST
3	Special high pressure A/N connectors

<u>Number</u>	<u>Subject</u>
3	High temperature paints
3	Magnetic metal forming
3	3-blade change-can mixer
3	Nontip life raft
3	Electronics bread-board post
2	Beryllia heat sink ceramic
2	Ballistocardiograph
2	Pressure transducing coatings
2	Remote chemical treatment of cooling towers
2	Magnetic reed switches
2	Video tape recorder
2	Impact protection for shipping electronics
2	Welding seam tracker
2	Stirred Arc heater
1	Klimp for crating
1	Frangible tubes energy dissipator
1	Liquid level sensor with servo feedback
1	Thermally insulating fabrics
1	Teflon insulated ribbon cable
1	Rubber chain drive system
1	Butterfly valve with inflatable seals
1	High temperature nickel base alloys
1	Explosive metalworking
1	Foam insulation for steel structures
1	Superior cleaning techniques
1	Adhesive bonding of mechanical elements
1	Vibration isolation mountings
1	Ion discharge ozone generator
1	Jet igniters
1	Circuit breaker
1	Kudl-Pac

4. Publicity: The fact that NASA's regional approach in the applications program is newsworthy and of great interest to the area was abundantly attested by the extensive coverage given to the ASTRA meetings in both news and editorial columns of daily news papers and magazines (see Appendix D). Newsmen stressed NASA's initiative in setting up an action program to get useful information directly and swiftly into the hands of commercial users. Typical reports of these presentations and editorial comment on the significance of the program are appended.



Over 1,000 Midwestern Businessmen Have Examined ASTRA Examples
of Space-Derived Products, Materials, and Techniques

We have deliberately avoided national publicity regarding the program, although local coverage by television and news media has been encouraged in order to help the concept of the project to reach a larger number of technically oriented firms.

5. Personal follow-up: After six regional meetings had been held, representing about half the area we plan to cover, a series of follow-up calls were made in the Omaha, Des Moines, and Kansas City regions.

Thus far, we have visited the plants and offices of 28 companies. In addition, six firms have visited the Institute to discuss specific problems and applications.

These calls served as an important source of feed-back from manufacturers. We learned at first hand their pressing technical interests. The degree to which manufacturers believed that space-related ideas would be useful to them was probed. We determined how well our message had gotten across and whether the ASTRA identity had been established.

Most importantly, through these calls we were able to test our ability to match industrial needs with the ideas already collected from NASA sources. Previously, at ASTRA meetings, project members were concerned with describing space-related ideas and their potential uses. The audience was left to do the matching. In personal visits we could call upon the whole range of technical advances that have been assembled and offer suggestions that could not have occurred to the manufacturer.

Interest generated by these calls, in applying space-derived ideas, is more vigorous and far more specific than that occasioned by general presentations.

The ASTRA identity and purpose is well established among those who have attended our introductory meetings. The basic idea that space-related ideas will be useful to business has been planted. But most manufacturers do not identify themselves as beneficiaries. They think space ideas will help only huge corporations; to them the ideas may appear as strange, exotic, expensive, impractical or useful only where cost is no object.

This was the usual attitude at the start of our personal visits. Without exception, before leaving, we were able to show manufacturers exciting possibilities for using new technology to their advantage. Many specific requests for information have resulted from these calls.

We conclude that personal consultation is one of the most important parts of the ASTRA dissemination program.

IV. TECHNICAL REGISTER

The Index of Technical Capabilities and Interest (see Appendix B) was developed by MRI to determine from the participating firms:

- a. Technical fields of greatest interest,
- b. Present capabilities and products, and
- c. How progressive and sophisticated they are in seeking new ideas.

Special attention was devoted to constructing the classification of technical fields on p. 2 of the Index. We attempted to use the least number of fields to describe (in business terminology, when possible) the areas in which we expect NASA output to have the greatest industrial applicability. The system employs 100 fields of technology, grouped into 10 areas:

Materials Sciences	Engineering Mechanics
Electrical/Electronic Technology	Chemical Sciences
Life Sciences	Data Handling and Display
Fabrication Technology	Physical Sciences
Instrumentation	Management and Control

The classification system has proved to be adequate for describing industrial interest; very few firms have written in additional areas of interest.

1. Fields of interest: Of the 241 firms attending the meetings as potential users of ASTRA information, 144, or 60 per cent, have returned a Technical Register. A detailed compilation of responses is given in Appendix C.

Most firms which have returned ASTRA Indexes have technically or scientifically trained personnel assigned to research and development or future technical planning. About half of these firms have a formal research program. Three-fourths of them have fewer than 500 employees and would be considered small business. About 40 per cent employ fewer than 100 persons.

Interest in the 10 technical areas varied considerably among cities, reflecting usually differences in the economic base of the city and the degree

of sophistication of the firms attending. But rankings of technical interests varied relatively little among cities. Fabrication Technology was either first or second in interest in all the cities but one. Subjects under Fabrication Technology were checked by almost 80 per cent of the respondents; Materials Sciences, Chemical Sciences, and Management and Control each was marked by about 70 per cent as areas of great interest. Life Sciences and Data Handling have been of least interest with audiences to date; each was checked by only about 40 per cent of the responding firms.

Analysis of the returns shows the following conclusions:

- a. The greatest interest centers on fabrication methods, especially metal working.
- b. Remarkably uniform distribution of interests is found in nine out of the 10 categories. Less interest was shown in Data Handling and Display than the other nine categories.
- c. Unexpectedly high interest was shown in corrosion and protective coatings, all phases of management and control, and adhesives and adhesive bonding.
- d. Surprisingly high interest was registered in new and relatively specialized fields such as cryogenics, thermoelectric and thermionic devices, ultrasonics, vacuum technology, thin films, human engineering, filament winding and nonlinear controls.
- e. In the more highly industrial areas, interests of both large and small firms tended to be broader.

Over half of the responding firms are in four major industrial classifications. Thirty-eight of the firms produce nonelectrical machinery, 33 produce electrical machinery and equipment, 32 are in the chemical business and 29 in fabricated metal products.

2. Industry response to ASTRA presentation: At each meeting to introduce the ASTRA program, attendees were given an opportunity to express their opinion of the entire program and of the presentation itself, to indicate some of their particular interests, and to record other reactions to what they had heard.*

* This technique, known as Idea Engineering, was perfected by Ernest L. Loen who attended the first orientation meeting, devised the questions used and analyzed the responses from the initial meeting.

A number of questions were asked the participants who recorded their answers anonymously on slips of paper. Approximately half those attending chose to participate in this response, and a number of conclusions can be drawn from their anonymous statements.

At the first three meetings, our questions sought primarily to elicit reaction to the presentation and to the ASTRA program. In general, the meetings were considered most worthwhile, the participants had few suggestions to improve the session, and they appeared to understand the purpose and implementation of the ASTRA program. A number of suggestions as to the mechanics of the meeting were adopted at subsequent meetings.

A finding which has been confirmed in the analysis of the ASTRA indexes is that interest is generally greater in processes and materials than in new products by a ratio of about 2:1.

There appears to be a strong desire for participants to identify themselves with the space effort. Thirty-two per cent indicate that they are supplying something to the space program, and 28 per cent that they are using a space-derived development in their business. The specific examples given in each case frequently have little or no space relation, however.

The reason most commonly given for not using space-derived technology is lack of information. Most firms have given little apparent thought to any benefits they might receive from the space program; even where there is some recognition of potential benefit, most firms are unaware of how they might get any useful information.

V. IDEA COLLECTION

In the first quarter, ideas were gathered primarily by means of direct personal contact with the NASA centers. We did not visit any NASA centers during this second quarter, but we had weekly contact by phone and letter with the centers to obtain additional information about ideas already identified as useful to industry. The prompt response of the applications representatives at the centers in providing additional documentation has been of great help.

In the second quarter, attention was focused primarily upon three other major sources of useful space-related ideas - NASA documents, developments by aerospace contractors or other commercial sources, and the NASA invention and patent files.

1. NASA documents: The project has been receiving all formal NASA reports and TN's since about 1 February. The reports are sorted as received into the 33 NASA categories. At intervals, the reports in each category are reviewed by at least two project members and Institute scientists versed in the various subjects to assess probable industrial value. Consideration is given to subject matter level of technical presentation and the inclusion of practical details. Reports which may contain ideas useful to industry are set aside for more detailed analysis and evaluation of potential applications.

By June, 1962, the project had received a total of 206 NASA publications. Of this number, 148 failed to pass an initial screening for commercial applicability. The remaining 58 reports are now being evaluated in detail for applications that may not be immediately apparent.

Based upon our observation over the past six months, we anticipate that about five to 10 per cent of NASA documents will contain commercially practical ideas of interest to industry.

The Jet Propulsion Laboratory Research Summaries, Program Summaries, and reports have not been handled in the above fashion because they are different in scope and content. These publications are, we believe, extremely useful sources of ideas. We are presently developing methods which will be adequate for processing JPL documents.

The most important change in our document processing plans was occasioned by the initiating of Technical Publication Announcements, Volume II. The expansion of this service to include reports from work done under NASA contracts and grants, as well as related reports having relevance to NASA investigations, immeasurably improves our capability to monitor developments of commercial interest.

To test the usefulness to the ASTRA project of this new bibliographic tool, the titles and abstracts contained in the first three issues were subjected to preliminary screening for possible commercial utility. From this six-week period, a total of 97 documents were selected as possibly containing ideas of value - a list nearly double the number screened from the NASA's formal reports in the first six months.

The significance of this development to our project is clear: greater emphasis must be given to the evaluation of ideas derived from these reports. Further, we must develop new ways to follow development programs. Since many contractor reports are progress reports rather than phase or final reports, their main usefulness is expected to be in improving our ability to follow potentially useful developments as they approach the stage of having

industrial applications. In the next quarter, attention will be given to methods for accomplishing this goal.

2. Commercial and industrial developments:

a. Journals: Many new developments are first announced by aerospace contractors in technical and trade journals. These commercial announcements enable us to:

- (1) Discern technological trends in industry;
- (2) Relate incoming new ideas to the "state-of-the-art," and
- (3) Avoid over-emphasizing well-publicized ideas.

We deliberately delayed consideration of these sources until experience had been gained with the primary NASA sources.

This commercial surveillance has proved to be a valuable source of useful, business-oriented ideas. Thirty journals are presently reviewed each month. Ideas collected from these sources are handled in two different ways. The majority of clippings are added to our files to provide background and documentation. Ideas which are new, space-related and have potential application are treated as an idea input and processed like ideas collected from NASA sources.

b. Meetings: To supplement the literature coverage, project members have attended symposia, technical meetings and trade shows. For example, because of the high interest in welding technology, Mr. Sneegas attended the American Welding Society National Exposition. Mr. Gadberry attended the Symposium on Manufacturing with Space Age Materials held by the American Society of Tool and Manufacturing Engineers. Several project members covered the National Association of Corrosion Engineers Exposition in Kansas City. Attendance at these trade shows and technical seminars is valuable in maintaining our industrial perspective as well as aiding us to gauge the level and kind of ideas currently of greatest interest to industry.

3. NASA inventions: To determine how important inventions and patents will be in the ASTRA program, we carried out a test marketing study. By spending three man-days examining the case records in the Office of Patent Affairs, we selected a few of the earliest and the latest of NASA's inventions to discuss at ASTRA meetings and subsequently with individual business firms.

In discussing NASA inventions, we have stressed the opportunity for industry to use these ideas if doing so is in the public interest, without discussing details about licensing arrangements, royalties, etc. We are acutely aware of the problems surrounding these matters, but no purpose is served by premature discussion of possible complexities.

We have emphasized that in cases where a manufacturer believes that he can effectively utilize a NASA invention, arrangements can be made so that patent technicalities will not be a serious problem.

Our immediate goal is to encourage Midwestern firms to enter seriously into negotiations to use or license NASA inventions. The first few actual cases of arrangements to use NASA innovations will clarify the situation, and make it easier for us to persuade other manufacturers to investigate such arrangements for themselves.

In ASTRA meetings, our discussion of approximately 25 inventions stimulated excellent response. The number of questions about patent rights asked during the discussion was surprisingly high, and disproportionate to the time spent on the review. Similarly, we have received requests for information on 41 issued patents and cases pending. Together, these represent one-third the inquiries we have received.

It is clear that patents and inventions are of great interest to industry. We need to have available the following pieces of information about the more than 800 cases on file: The NASA Case Number, the inventor, the title of the invention and a 25-50 word description of it, whether a petition for waiver has been filed or granted, and the present status of disclosure. We strongly recommend that this information be abstracted from the records as soon as possible, perhaps jointly by MRI and the Office of Patent Affairs.

4. Other sources: We are also maintaining contact with other people concerned with commercial development of space-derived ideas. Liaison with Denver Research Institute is well established to keep informed of their case histories of space by-products. Special product divisions of aerospace contractors (North American, Boeing, Northrup) are being contacted. The study conducted by Gottlieb Associates prior to the Second Conference on Peaceful Uses of Space has been useful as a source of cases in which space-related ideas were already finding commercial applications.

5. Processing and handling of data:

a. Classification, filing and indexing: Space-related ideas gathered from various sources, are classified, filed and indexed for easy retrieval. All ideas are classified under 10 major groupings, subdivided into

100 areas of technical interest. (See Appendix B, p. 2. This is the same system of classification used by industries to indicate the fields of technology of greatest interest to them.) Each subject is indexed and cross-indexed by subject and source.

b. Documentation and packaging: As a result of our experience during this second quarter in preparing ideas for wider distribution, we feel that a different form of idea packaging is indicated. A shift of emphasis rather than a basic change is involved.

Our plan still involves four phases of processing:

- (1) Technical assessment of ideas for industrial utility;
- (2) Acquisition of background material as documentation;
- (3) Prediction of new applications, and
- (4) Preparation of the idea in suitable form for wider distribution.

In this "idea processing," the technical skills of the project team will be best utilized if we place our major emphasis on technical assessment and prediction of new applications. These two activities require scientific training, a technical background, and an industrial outlook. Project talents are better used for these activities than for extensive literature searching, elaborate writing and formal publication. At this stage of the project, we do not plan an extensive program of publishing; we doubt its effectiveness, and believe that simpler steps should be tried first.

Our experience in documenting and preparing about 30 ideas for use in the ASTRA meetings as well as in corresponding and talking with businessmen, has led to the following conclusions:

1. It is not always possible to write a comprehensive monograph for each subject, primarily because adequate documentation of newly emerging ideas is frequently not available.
2. The time required for such treatment is excessive, particularly when we remember that businessmen want only enough information to be able to tell whether the idea will work in a particular application.

3. Some ideas do not lend themselves readily to written presentation.

Therefore, we plan to keep the format of presentation flexible and place the major effort on technical assessment and projection of uses. Working files of maximum usefulness will be prepared, and the information provided to each possible user will be tailored to his needs. The extent of interest in various ideas will be explored in visits and correspondence with the participating firms. The amount of later formal treatment each idea will receive will depend on the amount of interest found in industry.

A typical presentation which we have used thus far consists of a one- or two-page covering note, which identifies the relationship of the idea to the Space Program and stresses the opportunities to apply to industrial problems. This note is supplemental with a description of the idea and reprints relating to its use.

6. Plans for newsletter: Based upon the response to ideas discussed briefly at ASTRA meetings, we have concluded that a general news bulletin can help us test the market for ideas and will serve to "qualify" prospective users. Originally we viewed an ASTRA newsletter primarily as a means of maintaining interest among firms that infrequently received specific technical summaries. Hence we plan to devote more attention to the issuance of a periodical newsletter inviting requests for more complete information about ideas and applications.

Ideas have been selected for the first two issues. Copy is being written. The preferred format and design have been worked up in dummy form for NASA approval. We hope to begin distribution of this bulletin soon.

7. Mailing lists: To facilitate both general and selective mailings, two different addressing plans have been devised. One method will make possible selective mailings based upon (a) geographical location, (b) SIC classification of products produced, and (c) fields of technical interest. Several proposed systems were studied before selecting a method based on marginal punched cards which will handle multiple product classifications and numerous technical interests without producing duplications in mailing. Nonselective mailings will be addressed by conventional Speedomat plates. All information will be addressed to one person designated by the firm to be its contact with the ASTRA program.

VI. POSSIBLE SYMPOSIA

It became evident that in many fields of newer technology and management methods, dissemination in written form would not be adequate. (It is unlikely that anyone learns to do explosive metal forming by reading about it!)

After analyzing the interests expressed and reviewing the problems associated with presenting seminars or workshop training sessions in various fields, we selected a representative group of 14 subjects.

Using the list below, a sampling was obtained of the number interested in attending special training sessions. From this response, we propose to study the advisability of offering specialized training sessions in three quite different types of fields - processing methods, management techniques and materials selection and applications.

Preferences Expressed by Responding Firms for Various Workshop Topics

Fabrication Technology - 37.5 per cent

- Structural Adhesive Bonding - 11.3 per cent
- Magnetic Pulse Metal Working - 5.9 per cent
- Dust and Contamination-Free Environments (White Rooms) - 4.8 per cent
- Automatic Welding Equipment and Techniques - 3.9 per cent
- Reliable Soldered Connections - 3.9 per cent
- Filament Winding - 3.3 per cent
- Explosive Metal Forming - 2.7 per cent
- Welded Wire Packaging of Electronics - 1.8 per cent

Management Techniques - 25.6 per cent

- Selection and Management of Creative Personnel - 10.7 per cent
- Critical Path Management (PERT, PERT-Cost, P.D.P.) - 9.2 per cent
- Long Life Reliable Mechanical Products - 5.6 per cent

New Materials - 36.9 per cent

- Special Coatings and Protective Treatments - 20.8 per cent
- New Materials for High and Low Temperature Applications - 10.4 per cent
- Air Bearing Applications and Design - 5.6 per cent

VII. FUTURE WORK PLANS

Within the next three months we plan to carry on a variety of activities concurrently.

1. Visit Lewis and Goddard. Possibly revisit Marshall.
2. Review the Invention and Patent cases thoroughly.
3. Continue calling on the participating firms.
4. Start issuing a regular ASTRA newsletter.
5. Hold introductory ASTRA meetings in St. Louis, Davenport, Lincoln, Tulsa, Little Rock and possibly Springfield.
6. Select the content and schedule for three special training seminars or workshops to be held in the fall.

APPENDIX A

	<u>Omaha</u>	<u>Des Moines</u>	<u>Oklahoma City</u>	<u>Joplin</u>	<u>Wichita</u>	<u>Kansas City</u>	<u>Total</u>
Recorded Attendance ^{1/}	75	54	215	64	73	128	609
Pink Slips	41	47	84	60	62	113	407
Companies	54	41	84	47	52	63	341
Potential Users	38	21	53	31	30	63	240
Area Dev.	16	20	31	16	22	1	106
TR Returns	27	20	19	29	20	29	144
% Potential	71	95	36	94	67	7	60
Number with Re- search Programs	15	11	8	8	7	18	

^{1/} We estimate that 1,500 people have been formally introduced to ASTRA. Total attendance at the ASTRA orientation meetings was approximately 850, based on counts by MRI staff attending, and hotel personnel assisting in meeting arrangements. In addition, Dr. Charles Kimball addressed 100 Oklahoma businessmen and civic leaders at the Economic Club of Oklahoma on 12 March 1962. His talk there outlined the entire ASTRA program and contained a number of examples of space-derived technology. He made similar presentations at the Annual Meetings of the Kansas and Missouri Bankers Associations to approximately 450 people. At the Annual Meeting of the Board of Trustees of MRI, approximately 105 additional people heard Mr. Howard Gadberry give a similar review of ASTRA. About 40 of these Trustees were from the Kansas City area, the rest from throughout the U. S.



INDEX OF TECHNICAL CAPABILITIES AND INTERESTS

for

MRI INDUSTRIAL PROGRAM

In order for ASTRA to serve your firm more effectively, we ask you to cooperate by recording your specific technical capabilities and your fields of interest.

1. Name of Firm _____
 Address _____
 City _____ County _____ State _____
 Telephone _____
2. Please designate one person to receive and handle the information which this program provides.
 Name _____
 Title _____
3. Does your company presently sponsor a research program?

4. Number of technically or scientifically trained personnel assigned to research and development or future technical planning. _____
5. Total number of employees _____
6. Principal products (in order of volume)

a. _____	f. _____
b. _____	g. _____
c. _____	h. _____
d. _____	i. _____
e. _____	j. _____
7. Unusual or unique industrial capabilities (describe below). _____

8. What major technical advance within the next two years would be most beneficial to your firm?

Company
NameResearch and
DevelopmentCompany
Products

To aid ASTRA in the proper dissemination of continuing information, please check, in the boxes provided, the fields of technology of greatest interest to your firm.

Materials Sciences ☐

- ☐ Ferrous Alloys
- ☐ Nonferrous Alloys
- ☒ Physical Metallurgy and Heat Treating
- ☐ Powder Metallurgy
- ☐ Strength of Material
- ☐ Testing Methods
- ☐ Ceramics, Refractories, Glass
- ☐ Cement, Lime, Gypsum Products
- ☐ Abrasives
- ☐ Rubber and Elastomers
- ☐ Textiles, Fabrics, Fibers
- ☐ Wood, Paper, Cellulose
- ☐ Others (Specify) _____

Electrical/Electronic Technology ☐

- ☐ Components
- ☐ Solid State Devices
- ☐ Miniaturization/Microminiaturization
- ☐ Molecular Electronics
- ☐ Printed Circuitry and Cables
- ☐ Circuit Design
- ☐ Commun. Equipment and Techniques
- ☐ Telemetry
- ☐ Ground Support Equipment
- ☐ Motors, Gener., and Rotating Equip.
- ☐ Power Generation and Distribution
- ☐ Batteries, Fuel Cells, Secondary Power
- ☐ Thermoelectric and Thermionic Devices

Life Sciences ☐

- ☐ Medicine and Biochemistry
- ☐ Pharmaceuticals and Biologicals
- ☐ Human Engineering
- ☐ Bacteriology
- ☐ Fertilizers and Plant Growth Regulators
- ☐ Pesticides
- ☐ Food Additives
- ☐ Cereal, Bakery and Confectionery Products
- ☐ Meat, Fish, Dairy, Poultry Products
- ☐ Vegetable and Animal Oils and Fats
- ☒ Animal Feeds and Nutrition
- ☐ Food Technology and Processing
- ☐ Others (Specify) _____

Fabrication Technology ☐

- ☐ Materials Cutting, Shaping, Forming
- ☐ Welding, Brazing, Soldering
- ☒ Surface Finishing (inorganic-organic)
- ☐ Adhesive Bonding and Other Joining Methods
- ☐ Electroplating and Anodizing
- ☐ Composite Structures
- ☐ Melting and Casting
- ☐ Temporary and Special Tooling
- ☐ Processing Methods
- ☐ Packaging
- ☐ Filament Winding
- ☐ Reclamation and Salvage

Instrumentation ☐

- ☐ Recorders
- ☐ Timing Devices and Programmers
- ☐ Automatic Controls and Regulators
- ☐ Sensing Devices (I.R., U.V., Optical, etc.)
- ☐ Transducers (press, T°, level, etc.)
- ☐ Digitizers and Readouts
- ☐ Test Equipment
- ☐ Laboratory Instruments
- ☐ Medical Instrumentation

Engineering Mechanics ☐

- ☐ Machinery
- ☐ Gas Turbines
- ☐ Refrigeration and Air Conditioning
- ☐ Internal Combustion Engine
- ☐ Mechanisms
- ☐ Stress Analysis
- ☐ Power Transmission
- ☐ Bearings
- ☐ Pumps
- ☐ Nozzles and Sprays
- ☐ Servomechanisms
- ☐ Nonlinear Controls

Fields of Interest

Chemical Sciences ☐

- ☐ Fuels and Combustion
- ☐ Corrosion and Protection
- ☐ Lubricants and Fluids
- ☐ Explosives
- ☐ Adhesives
- ☐ Molding Plastics and Polymers
- ☐ Laminating and Reinforced Plastics
- ☐ Coatings, Paints, Inks
- ☐ Soaps, Detergents, Cleaners
- ☐ Others (Specify) _____

Data Handling and Display ☐

- ☐ Computers
- ☐ Information Storage and Retrieval
- ☒ Presentation and Display Techniques
- ☐ Signaling and Warning Devices
- ☐ Printing and Other Graphic Arts
- ☐ Learning Processes and Teaching Devices

Physical Sciences ☐

- ☐ Optical Devices
- ☐ Photography
- ☐ Sound and Noise
- ☐ Ultrasonics
- ☐ Radiation and X-Rays
- ☐ Magnetic Devices
- ☐ Thin Films
- ☐ Vacuum Technology
- ☐ Cryogenics
- ☐ Heat Transfer and Thermodynamics
- ☐ Seismic and Geophysical Prospecting
- ☐ Spectroscopy

Management and Control ☐

- ☐ Program Mgt. (PERT, PERT/COST)
- ☐ Value Analysis/Value Engineering
- ☐ Reliability and Long Life
- ☐ Quality Assurance/Quality Control
- ☐ Statistics and Decision Making
- ☐ Safety and Maintenance Engineering
- ☐ Economic Analysis
- ☐ Economic Study

PLEASE CHECK, IN BOXES PROVIDED, THE JOURNALS YOU ARE NOW READING

	<u>Seldom Read</u>	<u>Often Read</u>
1. Modern Plastics	<input type="checkbox"/>	<input type="checkbox"/>
2. Product Engineering	<input type="checkbox"/>	<input type="checkbox"/>
3. Food Technology	<input type="checkbox"/>	<input type="checkbox"/>
4. Electrical Design News	<input type="checkbox"/>	<input type="checkbox"/>
5. Missiles and Rockets	<input type="checkbox"/>	<input type="checkbox"/>
6. Aerospace Engineering	<input type="checkbox"/>	<input type="checkbox"/>
7. Space and Aeronautics	<input type="checkbox"/>	<input type="checkbox"/>
8. Industrial Research	<input type="checkbox"/>	<input type="checkbox"/>
9. Machine Design	<input type="checkbox"/>	<input type="checkbox"/>
10. Materials in Design Engineering	<input type="checkbox"/>	<input type="checkbox"/>
11. Chemical and Engineering News	<input type="checkbox"/>	<input type="checkbox"/>
12. Others (specify) _____		

Return to:

ASTRA
Midwest Research Institute
425 Volker Boulevard
Kansas City 10, Missouri

Reading List

APPENDIX C

PERCENTAGE DISTRIBUTION OF TECHNICAL INTERESTS COMPOSITE OF RESPONSES OF 144 MIDWESTERN FIRMS AS TO MAJOR FIELDS OF INTEREST.

<p>67.5 % <u>Materials Sciences</u> <input type="checkbox"/></p> <p>32 <input type="checkbox"/> Ferrous Alloys 32 <input type="checkbox"/> Nonferrous Alloys 23.5 <input type="checkbox"/> Physical Metallurgy and Heat Treating 11 <input type="checkbox"/> Powder Metallurgy 24 <input type="checkbox"/> Strength of Material 26 <input type="checkbox"/> Testing Methods 22 <input type="checkbox"/> Ceramics, Refractories, Glass 8 <input type="checkbox"/> Cement, Lime, Gypsum Products 10 <input type="checkbox"/> Abrasives 14 <input type="checkbox"/> Rubber and Elastomers 9 <input type="checkbox"/> Textiles, Fabrics, Fibers 7.5 <input type="checkbox"/> Wood, Paper, Cellulose <input type="checkbox"/> Others (Specify) <u>3.5 %</u></p>	<p>54.5 % <u>Electrical/Electronic Technology</u> <input type="checkbox"/></p> <p>24 <input type="checkbox"/> Components 20 <input type="checkbox"/> Solid State Devices 18.5 <input type="checkbox"/> Miniaturization/Microminiaturization 8 <input type="checkbox"/> Molecular Electronics 22 <input type="checkbox"/> Printed Circuitry and Cables 23.5 <input type="checkbox"/> Circuit Design 14.5 <input type="checkbox"/> Commun. Equipment and Techniques 18.5 <input type="checkbox"/> Telemetry 8 <input type="checkbox"/> Ground Support Equipment 20 <input type="checkbox"/> Motors, Gener., and Rotating Equip. 15 <input type="checkbox"/> Power Generation and Distribution 19.5 <input type="checkbox"/> Batteries, Fuel Cells, Secondary Power 22 <input type="checkbox"/> Thermoelectric and Thermoionic Devices</p>	<p>40 % <u>Life Sciences</u> <input type="checkbox"/></p> <p>8 <input type="checkbox"/> Medicine and Biochemistry 7.5 <input type="checkbox"/> Pharmaceuticals and Biologicals 15 <input type="checkbox"/> Human Engineering 9 <input type="checkbox"/> Bacteriology 14 <input type="checkbox"/> Fertilizers and Plant Growth Regulators 13 <input type="checkbox"/> Pesticides 11 <input type="checkbox"/> Food Additives 9.5 <input type="checkbox"/> Cereal, Bakery and Confectionery Products 11.5 <input type="checkbox"/> Meat, Fish, Dairy, Poultry Products 11 <input type="checkbox"/> Vegetable and Animal Oils and Fats 9 <input type="checkbox"/> Animal Feeds and Nutrition 11.5 <input type="checkbox"/> Food Technology and Processing <input type="checkbox"/> Others (Specify) <u>2</u></p>
<p>78 % <u>Fabrication Technology</u> <input type="checkbox"/></p> <p>47.5 <input type="checkbox"/> Materials Cutting, Shaping, Forming 52 <input type="checkbox"/> Welding, Brazing, Soldering 30 <input type="checkbox"/> Surface Finishing (inorganic-organic) 38 <input type="checkbox"/> Adhesive Bonding and Other Joining Methods 25.5 <input type="checkbox"/> Electroplating and Anodizing 13.5 <input type="checkbox"/> Composite Structures 12.5 <input type="checkbox"/> Melting and Casting 25.5 <input type="checkbox"/> Temporary and Special Tooling 32 <input type="checkbox"/> Processing Methods 25.5 <input type="checkbox"/> Packaging 12.5 <input type="checkbox"/> Filament Winding 13 <input type="checkbox"/> Reclamation and Salvage</p>	<p>55 % <u>Instrumentation</u> <input type="checkbox"/></p> <p>27 <input type="checkbox"/> Recorders 28 <input type="checkbox"/> Timing Devices and Programmers 34 <input type="checkbox"/> Automatic Controls and Regulators 27.5 <input type="checkbox"/> Sensing Devices (I.R., U.V., Optical, etc.) 21.5 <input type="checkbox"/> Transducers (press, T°, level, etc.) 14.5 <input type="checkbox"/> Digitizers and Readouts 25 <input type="checkbox"/> Test Equipment 28 <input type="checkbox"/> Laboratory Instruments 11.5 <input type="checkbox"/> Medical Instrumentation</p>	<p>64 % <u>Engineering Mechanics</u> <input type="checkbox"/></p> <p>31 <input type="checkbox"/> Machinery 19.5 <input type="checkbox"/> Gas Turbines 20 <input type="checkbox"/> Refrigeration and Air Conditioning 14.5 <input type="checkbox"/> Internal Combustion Engine 21.5 <input type="checkbox"/> Mechanisms 17 <input type="checkbox"/> Stress Analysis 18 <input type="checkbox"/> Power Transmission 22 <input type="checkbox"/> Bearings 24 <input type="checkbox"/> Pumps 24 <input type="checkbox"/> Nozzles and Sprays 18.5 <input type="checkbox"/> Servomechanisms 12.5 <input type="checkbox"/> Nonlinear Controls</p>
<p>70 % <u>Chemical Sciences</u> <input type="checkbox"/></p> <p>20.5 <input type="checkbox"/> Fuels and Combustion 38.5 <input type="checkbox"/> Corrosion and Protection 18 <input type="checkbox"/> Lubricants and Fluids 8 <input type="checkbox"/> Explosives 28 <input type="checkbox"/> Adhesives 30 <input type="checkbox"/> Molding Plastics and Polymers 30 <input type="checkbox"/> Laminating and Reinforced Plastics 38.5 <input type="checkbox"/> Coatings, Paints, Inks 20 <input type="checkbox"/> Soaps, Detergents, Cleaners <input type="checkbox"/> Others (Specify) <u>3.5</u></p>	<p>40 % <u>Data Handling and Display</u> <input type="checkbox"/></p> <p>17.5 <input type="checkbox"/> Computers 16.5 <input type="checkbox"/> Information Storage and Retrieval 17.5 <input type="checkbox"/> Presentation and Display Techniques 16 <input type="checkbox"/> Signaling and Warning Devices 14 <input type="checkbox"/> Printing and Other Graphic Arts 19.5 <input type="checkbox"/> Learning Processes and Teaching Devices</p>	
<p>56 % <u>Physical Sciences</u> <input type="checkbox"/></p> <p>14 <input type="checkbox"/> Optical Devices 11.5 <input type="checkbox"/> Photography 17.5 <input type="checkbox"/> Sound and Noise 18 <input type="checkbox"/> Ultrasonics 11 <input type="checkbox"/> Radiation and X-Rays 21.5 <input type="checkbox"/> Magnetic Devices 11 <input type="checkbox"/> Thin Films 12.5 <input type="checkbox"/> Vacuum Technology 18.5 <input type="checkbox"/> Cryogenics 31 <input type="checkbox"/> Heat Transfer and Thermodynamics 6 <input type="checkbox"/> Seismic and Geophysical Prospecting 12.5 <input type="checkbox"/> Spectroscopy</p>	<p>68 % <u>Management and Control</u> <input type="checkbox"/></p> <p>37 <input type="checkbox"/> Program Mgt. (PERT, PERT/COST) 28 <input type="checkbox"/> Value Analysis/Value Engineering 23 <input type="checkbox"/> Reliability and Long Life 38 <input type="checkbox"/> Quality Assurance/Quality Control 34 <input type="checkbox"/> Statistics and Decision Making 28 <input type="checkbox"/> Safety and Maintenance Engineering 29 <input type="checkbox"/> Economic Analysis 28 <input type="checkbox"/> Economic Study</p>	

APPENDIX D

NEWSPAPER ARTICLES

City Firms to Get Space Information

Machinery has been established to get space research information directly into the hands of the industrialist who can use it with the greatest possible speed, Oklahoma businessmen were told Friday.

James Alcott, senior economist for the Midwest Research Institute, said the major problem is to find the particular ideas to fit a particular industry in all of the mass of research information currently available and still being developed.

200 Hear Talk

But he told the more than 200 attending a conference sponsored by the Frontiers of Science Foundation that all they would have to do is to give some indication of what they want to know in a "technical register" being compiled by MRI.

Those attending the conference here were handed a four-page questionnaire giving some indication of the type of business, and the type of information sought.

Bulletins Due

There will be distribution in several ways. There will be a general news letter. Special technical bulletins in more detail will be sent to individual firms.

Team members from MRI will call upon industries in their own plants to inspect facilities where asked.

Free Service

The entire service is free since the space information was developed at taxpayers' expense, and the National Aeronautical Space Administration is charged by law with distributing the information.

Businessmen, however,

must take the initiative of asking for the information and then use their imagination to "get a two-year jump on the competition if you expect to profit most."

How Science Aids Industry

Not long ago, space scientists needed a new and delicate type of bearing for their rocket directional systems. They found their answer — and inadvertently provided a mechanism which promises to help in diagnosis of heart ailments.

This kind of technical "bonus" is typical of rapidly moving developments in the space age as applied to industrial purposes and described Friday by a research specialist.

Help Outlined

Oklahoma businessmen and industrialists attending a workshop sponsored by the Frontiers of Science Foundation heard Howard M. Gadberry of the Midwest Research Institute, Kansas City, tell them how space technology can help them.

Assistant director of the institute's chemical division, Gadberry said space exploration will answer many important scientific questions. But, he said, the knowledge most useful to industry will come not in the basic discoveries but in the technological advances developed in support of space exploration.

Advances Told

A number of technical advances have already developed beyond our original space-oriented environment and have become commercial products, Gadberry said.

One is the ballistocardiograph, an advanced form of the electrocardiograph, extremely sensitive to the recoil and flutter of the heart and its valves.

It uses a type of air bearing developed originally for the controls for the Saturn rocket.

Gadberry said owner of 1962 models of a certain automobile are benefiting from space-age printed circuits which are more reliable

and take up less space than the conventional dash-board wiring harness.

From missile fuel handling systems requiring an electrical valve that opened and closed quickly came a silent solenoid valve for home furnaces that eliminates the pounding thump in thermostats as they go on and off.

The extremely thin skin of aluminum and Mylar film created for the Echo II satellite will be useful, Gadberry said, for the rapidly expanding field of "boil-in-pouch" packaging of foods or for packaging of freeze dehydrated meats.

Raft Developed

Also in the future will come life rafts which will not tip even when a man stands on the edge. And lightweight emergency life vests that can support a man wearing a water-filled space suit.

Gadberry also said the biomedical monitoring systems used in manned space exploration to send back data on spacemen's body functioning will have numerous commercial applications. One is monitoring the physiological post-operative patients in hospital recovering rooms. Another is its possible use to check on the condition of workmen such as sandhogs and athletes and other persons subjected to high-stress conditions.



PRACTICAL commercial results of space age research were brought to Oklahoma City Friday by, left to right, Louis B. C. Fong, chief of the industrial applications office of the National Aeronautics and Space Administration; Dr. Charles Kimball, president of the Midwest Research Institute, and Edmund Buryan, industrial consultant of NASA and former president of Motex Industries, Minneapolis, Minn. They were here for a meeting of business men sponsored by the Frontiers of Science Foundation.



A CERAMIC material designed for the heat and cold of space travel in a missile nose cone proved ideal for a new frying pan, Dr. Charles Kimball, president of the Midwest Research Institute, Kansas City, pointed out here for Oklahoma industrialists seeking opportunities to build payrolls from space research.

Not Just Moonshine

A VISION of what the man-to-the-moon project can mean not only for science but for industry and the ordinary lives of all of us was presented here this week by Dr. Charles Kimball, president of Midwest Research Institute of Kansas City.

Speaking before the Economic Club of Oklahoma, Dr. Kimball said the major goal of the National Aeronautics and Space Administration (NASA) is to send men on a safe round-trip to the moon. "But," he added, "to consider this the only objective of the space program would be as short-sighted as saying that the exploration of the western part of the United States was to enable men to see the Rocky Mountains or to take a swim in the Pacific Ocean."

Dr. Kimball then reeled off a long list of discoveries and inventions already resulting from space research to prove that the "fall-out" of knowledge may be as important in the long run as achievement of the actual goal itself. Already the impact is being felt in industry, in our universities, and elsewhere (see article on this page about the reaction of the Air Force).

FOR Oklahoma the impact will be three-fold:

ONE—The potentiality for the establishment of aerospace industries here. The North American Aviation "Apollo" project already has been designated for Tulsa. Sen. Robert Kerr asserts another such major project is coming to Oklahoma. Subsidiary contracts and industries would be bound to follow.

TWO—Our universities should be in line for some of the research being farmed out by NASA. The \$30 to \$40 billion or more to be spent on the moon project will by no means all go for hardware. Because scientific "brains" are in such short supply, NASA wisely is taking many of the projects to the scientists in the universities, instead of attempting to do it all with the research men it can attract to the agency. Already inspected are OU, OSU, OCU, and Tulsa University.

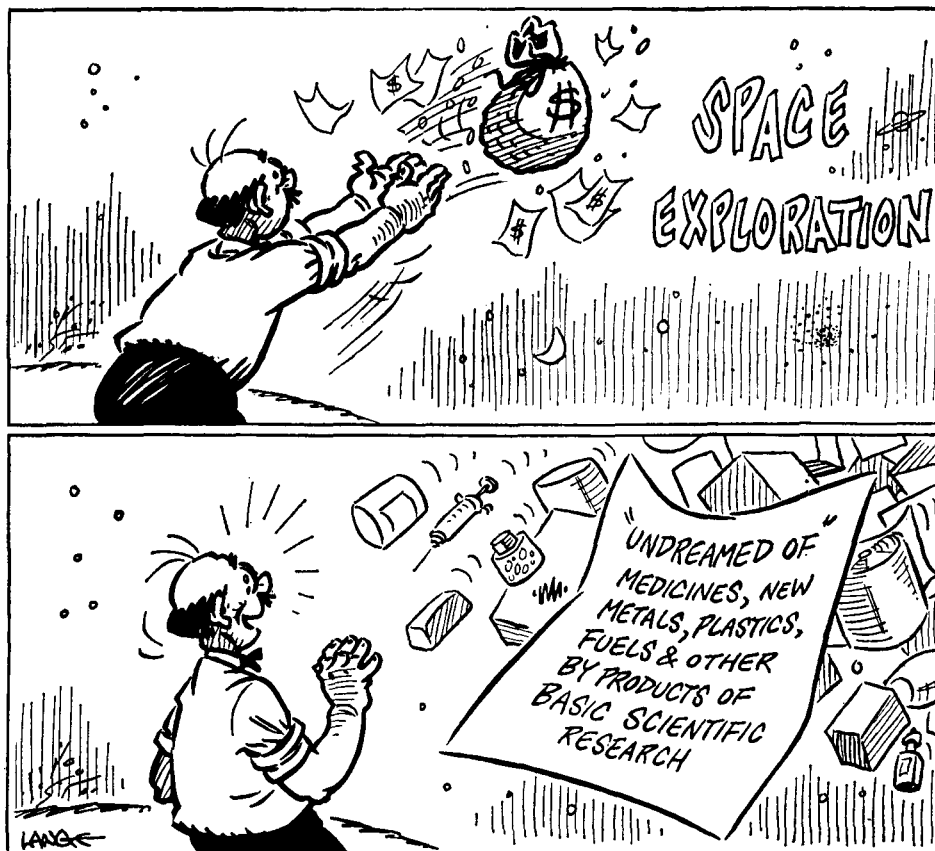
THREE—Our citizens, in common with all Americans, will share in the benefits of the scientific discoveries. Some mentioned by Dr. Kimball: Thermoelectric devices for heating and cooling; materials for pots and pans, coming from research on materials for missiles; medicines for heart disease and mental disorders, coming from missile fuel research; printed cables for electrical wiring; air bearings with air as the "lubricant;" plastic "skins" useful for packaging.

The moon project seen in this light is not just moonshine. As Dr. Kimball put it, this effort could be the means by which we could have a decade of scientific advance that would dwarf any other 10 years in mankind's history.

THE DAILY OKLAHOMAN

Cast Your Bread Upon the Waters

Wed., March 14, 1962



-Editorial Opinion-

Unmatched Opportunity for Nebraska

A hundred years ago the federal government assured the agricultural development of Nebraska and surrounding states through the Homestead Act. Now, in 1962, the federal government is offering to assist materially in the industrial development of Nebraska and its neighboring states.

The vehicle for such a modern day contribution is the release to private business of vast amounts of scientific information compiled by the National Aeronautics and Space Administration (NASA) for its space exploration.

* * *

The results of NASA's research are, of course, available to industry all over the nation. But a special effort is being made by NASA to stimulate the commercial use of this information in the 6-state mid-continent area of Nebraska, Iowa, Kansas, Missouri, Oklahoma and Arkansas.

* * *

The object is to offset the concentration of NASA-related industries on both seacoasts and to stimulate industrial development in the midlands, where it is lagging most.

The extent of help now available to alert and imaginative manufacturing firms in this 6-state area was revealed at a little-heralded meeting of Nebraska business leaders in Omaha Thursday.

There it was disclosed that in addition to an engraved invitation to share in NASA's treasure trove of research, businessmen from this area will have inestimable assistance from the Midwest Research Institute (MRI) in Kansas City in evaluating, interpreting and putting to use NASA's knowledge.

Most Nebraskans have not yet grasped the limitless range of products which can be fashioned from the new materials, metals, alloys, fabrics and compounds developed by NASA for space exploration.

The ceramic material which allows a nose cone to withstand intense heat and re-enter the atmosphere already is being put to use in cooking wares. The thin, tough plastic which forms the famous Echo I balloon satellite is being adapted to a myriad of uses in packaging. These are but a sample of

what already is underway and is yet to come.

* * *

This is a once-in-a-lifetime opportunity for Nebraska which no resident of the state can afford to ignore. No greater help for industrial development here will ever come along. Even with the exceptional assistance being offered, however, it will take some effort on the part of the state.

* * *

First, it will take an organized program to alert businessmen over the state to the vistas which have been opened to them. This should be a first order of business for the State Chamber of Commerce and the Associated Industries of Nebraska. It also will require the help of state government through the Resources Division.

The state already has another agency ideally suited to working with this movement, the Nebraska Industrial Research Institute created by the last Legislature. The Institute was launched without funds. But with a small amount of private money now to hire a bit of a staff, it would be a natural to coordinate this movement.

The state will need something more, too, if this opportunity is not to be missed.

It will need to change its attitude which has regarded most scientific advancement with suspicion and which has worshipped the status quo. This is the attitude which permits most of its representatives in Congress to oppose expenditures for NASA (only Reps. Weaver and Cunningham voted for this last year) and which—at least until John Glenn's exploits—dismissed space research with tired jokes about putting the national budget into orbit.

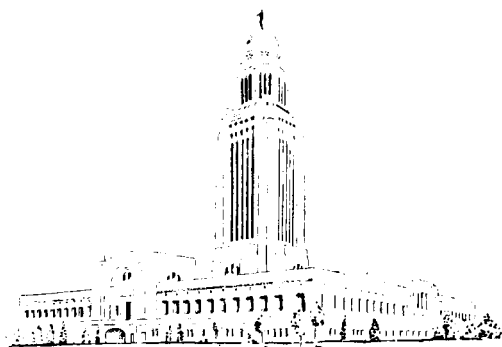
This is the attitude, too, which allows the University of Nebraska, the state's greatest potential tool for industrial development, to be vilified for its research endeavors and which cheers when the Legislature takes its ax to the University's appropriation requests.

This opportunity for Nebraska—perhaps literally the most promising since the Homestead Act—will go far to meet the state's greatest needs: industrial expansion and jobs for its skilled young people.

* * *

In its response to this opportunity will be revealed much of the state's future.

FRANK B. MORRISON
GOVERNOR



STATE *of* NEBRASKA
EXECUTIVE OFFICE

LINCOLN

March 8, 1962

Dr. Randall Klemme
Conference on Space Technology
Midwest Research Institute
Sheraton-Fontenelle Hotel
Omaha, Nebraska

Dear Dr. Klemme:

It is my privilege and pleasure as Governor of the State of Nebraska to welcome the participants from the six-state area of Iowa, Kansas, Missouri, Oklahoma, Arkansas and Nebraska who are taking part in this valuable conference.

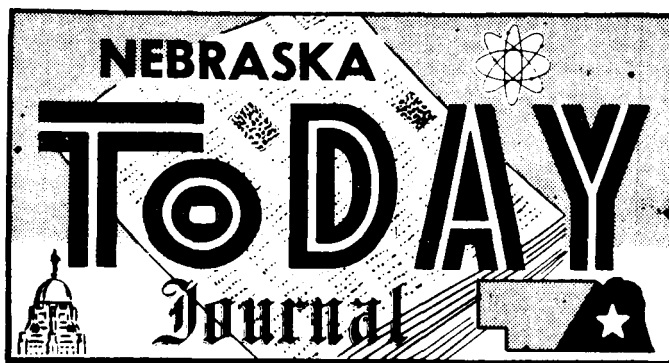
It is always a worthwhile endeavor to attempt to find ways of practical application of the great advances that are constantly being made in scientific research. Of course, the most prominent in the minds of people today are the tremendous scientific advances that have been made in the field of space technology.

I think Colonel Glenn put into perspective our achievements and our future in space and, to paraphrase President Kennedy, "Now is the time to begin" in the great opportunity that lies ahead.

Sincerely,

Frank B. Morrison
GOVERNOR

FBM:s



Midwest States Seek Space Program Roles

ASTRA Launched by Industry Leaders at Omaha Conference

By Ron Gibson

Omaha—Project ASTRA, an effort to let Nebraska and other midwestern industries in on the nation's space program, was launched here.

The name ASTRA means applied space technology regional advancement and was coined by the Midwest Research Institute (MRI) of Kansas City, which held the first of 15 regional conferences with industry leaders here.

The National Aeronautics and Space Administration (NASA) has given MRI the job of speeding up the flow of technical advances from the space program to industry in the states of Nebraska, Iowa, Kansas, Missouri, Oklahoma and Arkansas.

The Kansas City firm hopes to accomplish this through ASTRA.

The program has two phases. One is to get universities in the region more closely involved in the nation's space effort. The other is to get private industry to benefit from and contribute to the space program.

Dr. Charles N. Kimball,

MRI president, had this to say to the conference:

"Every project must have a pinpointed goal, and NASA's is to send men on a safe round-trip to the moon.

"But to consider that this is the only objective of the space program would be short-sighted as saying that the exploration of the western part of the United States was to enable men to see the Rocky Mountains or to take a swim in the Pacific Ocean."

The output of NASA is knowledge, Kimball said, and the space effort will bring a flood of new benefits to all mankind.

Research directed toward our space effort has already paid off in products little dreamed of at the beginning of the effort, Kimball said.

Midwestern businessmen need to know more about these new materials than their fathers knew about steel, Kimball said.

Space-Industry Talks Scheduled

Omaha — The first in a series of 15 regional conferences on the benefits to midwestern industry from space technology will be conducted by Midwest Research Institute here Thursday.

Some 150 representatives of Nebraska businesses are expected at the session.

The institute has been engaged by the National Aeronautics and Space Administration to study the potentials for increased participation by universities and business firms in the technology resulting from space exploration.

MAR 24 1962

City Glimpses Latest Things In Space Age

Business Group, Top Students See Science Display

By Jim Reid

Cooking ware coated with a substance that prevents food from sticking . . . a frying pan made of a tough material used in guided missiles . . . a "printed" electrical cable developed for use in rocket boosters . . . a metallized plastic "skin" one-half of a thousandth of an inch thick.

These were among dozens of new space-age products described and displayed here Friday for the benefit of some 200 Oklahoma City business and industrial leaders, plus some of the city's brightest high school students.

Scientists from Midwest Research Institute in Kansas City explained how many of these technological advances developed through space exploration can be manufactured for commercial uses.

The "workshop" was put on by the Frontiers of Science Foundation in co-operation with the Oklahoma City Chamber of Commerce.

Howard M. Gadberry, assistant director of MRI's chemical division, said the number of technical fields embraced by space exploration is unmatched in the entire history of science. "And, while we can not accurately forecast the future of any particular new idea, we can state with certainty the results that will

come from massive research efforts — new discoveries, improved technology, new products, economic progress for the nation, and profits for the astute businessman."

Gadberry demonstrated a "resistoflex connector," a tube connector developed and used on the Mercury program. It can hold hard-to-handle helium at 5,000 pounds-per-square-inch, and can operate from -400 degree to 1,000 degrees Fahrenheit with no leakage.

The connector is now being used on steam hoses, hydraulic lines, in dry cleaning plants and on die casting machines.

He also demonstrated an "air bearing," such as is used in gyroscopes and inertial guidance systems of satellites and space vehicles. The moving parts are separated only by a thin film of air and the rotor turns almost without friction.

The principle on which the bearing is based has been incorporated into a new type of ballistocardiograph on which the patient is held in space by a jet of air. Because of the device's sensitivity, it can detect minor heart disturbances.

Missile or Kitchen

Gadberry exhibited a piece of nucleated glass, called pyroceram. Its thermal shock resistance and high strength make it equally suited for nose cones on missile range or for skillets on the kitchen range.

He displayed a specimen of Mylar film used to construct Echo I, this country's first communication satellite. The "skin" is a polyester film only one-half of a thousandth of an inch thick, the strongest thin plastic available. It's coated with a micro-thin reflecting aluminum foil. It can be used in "cook-in-container" packaging of foods or for packing freeze dehydrated meats.

One of the toughest cutting edges ever devised has come out of the space program. It is a sintered oxide ceramic bit. The material was developed for use in rocket nozzle inserts.

Gadberry said safety equipment developed on the Mercury program that may have commercial interest includes a radar reflector in a package the size of a crackerbox, an inflatable life raft and flotation pack, the latter collapsed to the size of two packs of cigarettes and biomedical monitors similar to the ones attached to the skin of astronauts to record body functions.

"New products based upon space developments, or produced using the techniques and materials created for space will be evident in growing numbers within a year or two," Gadberry said.

"The enlightened exploitation of space technology can be profitable to industry."

JOPLIN NEWS HERALD

JOPLIN, MISSOURI, TUESDAY, APRIL 17, 1962

Scientist Explains . . .

Space Age Panorama Unveiled

By LES PEARSON

A vast new panorama of industrial and commercial applications for products and processes emerging from the space age is being unveiled here today in a conference at Bob Cummings motor hotel.

In the first meeting of its type in Missouri, officials of the Midwest Research Institute of Kansas City will explain a three-part program aimed at promptly feeding into the economy of a six-state region—and more particularly into the immediate Joplin area—the benefits of space research.

Dr. Charles Kimball, a soft-spoken scientist who is president of the 18-year-old Midwest Research Institute, explained the program to this reporter this morning in advance of the conference scheduled to begin at 2 o'clock this afternoon and to be attended by about 100 industrial and business men from the surrounding area.

MEANING OF PROGRAM

In a succinct summary of the program and its meaning for the area, Dr. Kimball said "this is the opportunity of a lifetime in the Middle West. The atomic age passed Missouri by and if we let the space age pass us by we may be a non-industrial economy for generations."

The Space Act of 1958, which established the National Aeronautics and Space Administration and is the basis of the nation's mushrooming space program, carries with it the obligation for NASA to share its knowledge with private industry and business so as to promptly feed back into the economy the benefits of space research.

The Midwest Research Institute, a non-profit Kansas City-based organization organized 18 years ago to conduct research of all kinds, has been selected to conduct the three-year, three-part

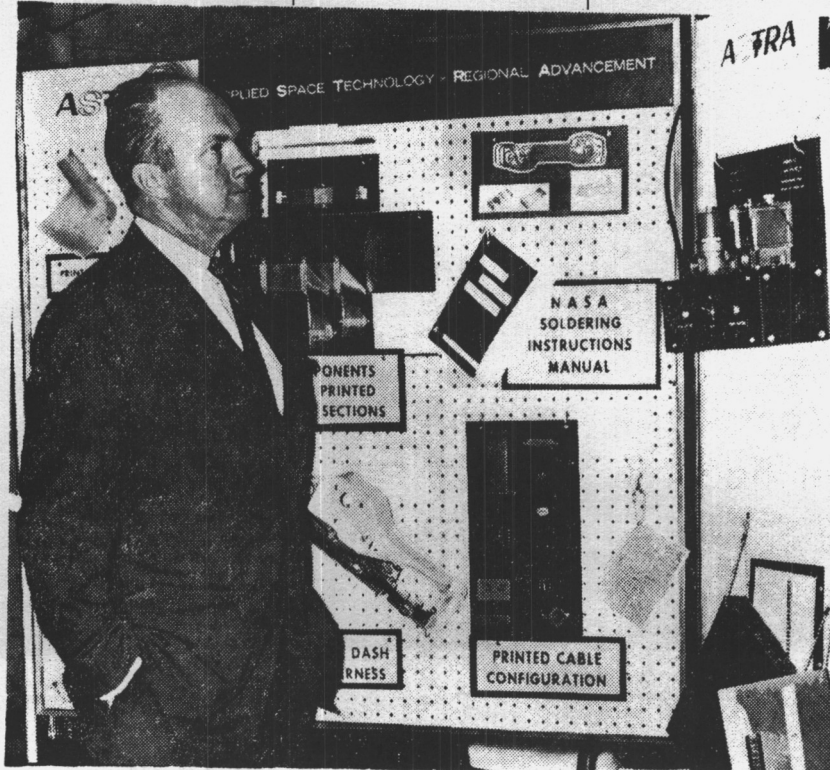
program in Missouri, Kansas, Arkansas, Oklahoma, Iowa and Nebraska.

Major impact of the program to be conducted by the Institute over a three-year period will come in the first two phases, having to do with stimulating research and training of qualified scientists in the six-state area and with making available to industry and business in the region necessary know-how for adaptation of new products and processes emerging from space age technology.

WORK WITH SCHOOLS

Dr. Kimball said one phase of the program will be working with 15 major universities in the six-state region—including Missouri university, Kansas City university, Washington university and St. Louis university in Missouri—to "provide NASA and the universities a greater opportunity for cooperation with a particular emphasis on graduate research."

In this connection, Dr. Kimball



Scientist Here Today

Dr. Charles Kimball, president of Midwest Research Institute, looks over one of several display boards scheduled for use this afternoon during a conference aimed at making available

to area business and industry the new products and processes emerging from the nation's space research. — (Joplin Globe-News Herald staff photograph.)

Space Age Panorama Is Unveiled

(Continued from page 1)

said the Institute's objective "is to accelerate the growth and capability of these schools in space science." At the present rate of training of persons in these fields, Dr. Kimball said the nation by 1970 would be "75 per cent short of meeting our commitments."

He said NASA can provide aid, "not the least of which is financial," to schools in expanding their graduate programs in these fields. To this end, representatives of all 15 universities and of the National Aeronautics and Space Administration itself will meet May 4 in Kansas City for further exploration of this phase of the program.

Of more immediate import to the communities in the six-state region can be the phase in which processes and products arising from space technology are given commercial application.

Dr. Kimball said the organization's objective in this phase of the program will be to "take scientific findings and translate them into things they can specifically use in industry and business."

"We have uncovered about 150 new products or processes," as a result of the nation's space program, Dr. Kimball said, and "we need to know what industry needs to know" in order to adapt those products and processes to commercial uses.

TRAINING SCHOOLS

The Institute, for example, will conduct training schools in which the new products or processes and their applications will be studied.

"We're going to work hand in hand with these people," he said. By way of illustration of the role the Institute will play in the program, one of several displays mounted in the conference room at the motor hotel lists these pur-

poses to be fulfilled by Midwest Research Institute:

1. Acquiring technological information resulting from space research and exploration.
2. Evaluating this information for potential commercial use.
3. Translating it into practical applications.
4. Transmitting it to industries for use.

In this context, the Institute really will be serving as a catalyst through which the massive amount of money being spent on space exploration can produce an effect in the nation's economy through new products and processes, adapted for commercial uses.

ITEMS EXPLAINED

By way of example, Dr. Kimball and Howard Gadberry, institute scientist in charge of the NASA program for Midwest Research Institute, explained various items on display boards set up in the conference room.

One example involved the wiring harness for the dashboard of automobiles. Formerly requiring a bulky set of wires and cables under earlier methods, the same purpose now can be accomplished by use of what are known as printed cables, with this concept emerging from the space program.

Another example is in the discovery that the skin of the Echo satellite balloon also makes an "excellent" insulator, because it was developed to withstand extremes of heat and cold to serve its purpose.

New kitchenware is being manufactured from materials used in missile nose cones, with its adaptation to commercial use being possible because of its ability to withstand extreme temperatures.

Gadberry pointed out other new developments, including a variety

of new methods for forming metals arising from the space age. New welding and soldering processes are being applied as a result of their development in the space program. The entire field of portable powered equipment is receiving a distinct impact from the space program, he said.

DIFFERENT AGE

With all these possibilities and many dozens more which are probably just around the corner, Dr. Kimball said the Institute's assignment is to "stimulate the imagination of industrial people and make them aware that we're living in a completely different age than we were 10 years ago."

By way of example, he pointed out that if the nation had not had to develop radar during World War II, we would probably not have television today.

The third phase of the program involves a county-by-county study of the economic impact of translating space age technology into commercial adaptations in the six-state area and Dr. Kimball said it will require the full three years before any realistic analysis can be made.

The six-state midwest region is being used as the location for the first program of this kind in the nation, Dr. Kimball said, but there is considerable likelihood that the program will be applied nationally if it proves successful in the area now being studied.

Midwest Research Institute was organized, Dr. Kimball said, to conduct all kinds of research and development work. The firm today does research and development for private companies, state governments, trade associations, communities and federal agencies, Dr. Kimball said. Lauren Reynolds, president of the First National Bank, is a member of the board of trustees of the Institute and is handling arrangements for today's conference.



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Carthage, Missouri

Space Age Technology Information Told To Area Business And Industrial Leaders

Officials of the Midwest Research Institute, Kansas City, opened the door to information concerning space age technology to business, industry, government and civic leaders at a 4-state area conference held yesterday in the Bob Cummings Motor Hotel.

Dr. Charles Kimball, institute president, explained the "Astra" program which the National Aeronautics and Space Administration has commissioned the Kansas City organization to carry out in six states including Missouri.

He said that "Astra" means "applied space technology equals regional advancement."

The conference launching the program in Missouri is one of a series to be held to bring knowledge about new products and new processes emerging from the 4-year old space program to industries for the sake of spurring industrial growth and efficiency.

The institute, in carrying out its contract for the U.S. space organization, will also channel information from the 16 space installations including Cape Canaveral to universities in Missouri and the five other states.

New products from space technology already in commercial use

include air bearings, high temperature paints, cooking ware, high speed cameras and many others.

The institute speakers said that industries can make use of patents held by the National Aeronautics and Space Administration by showing that such use is in the best public interest.

Kimball noted that the need of Missouri and nearby states to utilize space technology for industrial growth is particularly great because so much governmental and business activity resulting from the nation's space efforts is centered on the east and west coasts.

He emphasized that the universities in the six states must have greatly strengthened research programs to make much of the desired growth possible.

Attending the institute space briefing from Carthage were E. L. Dale, Harold Williams, Gary Knost, State Rep. Robert E. Young, R. M. Holiday and Joseph A. Cameron.

The conference was opened with welcoming remarks by L. R. Reynolds, Jr., president of the First National Bank of Joplin. Reynolds and Dale are trustees of the Midwest Research Institute.

MAR 9 1962

Space Help To Industry

A big effort has begun in Iowa and five other states to bring science down to earth.

Dr. Charles Kimball of Kansas City, Mo., in Des Moines Friday to explain the plan to representatives of about 100 businesses, said the program is the first of its kind in the nation.



Dr. Kimball **KIMBALL** is president of the Midwest Research Institute, the firm that is acting as the co-ordinating center for the program.

Aim

It's aim, he explained, is to give businesses and universities the benefit of scientific knowledge gained by the National Aeronautics and Space Administration (NASA).

NASA is the government agency engaged in research and development work for lunar and planetary exploration and other related space projects.

"Part of the legislation that set up NASA requires that information learned from space work be made available to industries and universities," Dr. Kimball said.

Dr. Kimball and other officials from the Kansas City research firm explained the program to business representatives at a meeting Friday in Hotel Savery.

MAR 10 1962

EYE PRODUCTS OF SPACE RACE

The national space program will "directly contribute to the economic improvement of Nebraska and Iowa," Dr. Charles Kimball, president of Midwest Research Institute, said here Friday.

Dr. Kimball spoke to about 100 businessmen at a meeting sponsored by the National Aeronautics and Space Administration at Hotel Savery.

"New products, new ideas, new techniques of production will flow out from the space effort. . . . will create new markets and new needs for capital and labor," he said.

The institute has been engaged by NASA to study the potentials for increased participation in the space program by universities and business firms in a six state area.

MAR 22 1962

Industry May Benefit

Workshop to Provide Ideas

Hundreds of new materials and ideas — any one of which could produce a new pay roll — will be disclosed to Oklahoma industrialists and businessmen Friday.

They will be featured at a two-hour workshop opening at 10 a.m. in the Skirvin Hotel. Dr. Charles Kimball, president of the Midwest Research Institute, will attend along with a team of his experts and representatives of the National Aeronautical and Space Administration.

Special and public invitations have been issued to the meeting by the Frontiers of Science Foundation, E. K. Gaylord, chairman of the board, said.

The foundation and the chamber of commerce are sponsoring both the workshop and a luncheon at which Dr. Kimball will speak.

Kimball said he would bring "many more actual products" to the Oklahoma City meeting than he did two weeks ago when he spoke here before the Okla-

homa Economic Club.

He showed a frying pan made from a ceramic material developed for a missile nose cone and a new, compact and efficient instrument panel for an automobile, and told of improvements that will come in medical instrumentation.

The experts will cover everything from new medical information to fuels and materials that may have far more important civilian applications than their use in space.

Dr. Kimball said part of the purpose of the meeting here is to "establish a scientific register" through which information can be channeled to the firms that can use it.

The Midwest Research Institute has a contract to expand the distribution of such information from NASA, both to private firms and to colleges and universities.

There is no charge for the workshop registration, and the only charge for Dr. Kimball's speech is a luncheon ticket since the Frontiers of Science is sponsoring the visit here.

OKLAHOMA CITY, OKLA., OKLAHOMAN
Circ. D. 158,132 S. 246,412

MAR 23 1962

Registration Passes 200 For Industrial Workshop

An industrial workshop dealing with new materials and ideas has outgrown its quarters before getting under way.

Planners of the Friday session said a heavy advance registration will force the workshop to move from the Skirvin Hotel Balinese Room to the hotel's 14th floor Continental Room.

More than 200 business and industrial leaders have signed up.

Scheduled to start at 10 a.m. Friday, the workshop will feature discussions and demonstrations by Dr. Charles Kimball, head of the Midwest Research Institute, Kansas City, and members of his staff.

Following the two-hour conference, Dr. Kimball will be featured speaker at the weekly Friday Forum luncheon of the Oklahoma City Chamber of Commerce.

The chamber and the Frontiers of Science Foundation are sponsoring the conference which will give Oklahoma City industrialists a chance to see hundreds of new materials that could produce new industry here. There is no charge for the workshop, but participants must purchase a luncheon ticket.

Dr. Kimball's organization has a contract with the National Aeronautical and Space Administration (NASA) to survey manu-

facturing potentials in Oklahoma and five other states.

The new materials and ideas to be discussed have been produced in connection with space research, but are highly adaptable for commercial production.

MAR 24 1962

Brainpower Called Key To Securing Industries

Oklahoma's future industrial progress will depend largely on its development of "brainpower" rather than "brawnpower," one of the nation's leading scientists said here Friday.

Dr. Charles Kimball, president of the Midwest Research Institute at Kansas City, said "space age" industries do not seek sites on the promise of tax favors or cheap labor.

"These industries," he said, "need skilled men at any price—they need brainpower."

Speaking at the Friday Forum luncheon of the Oklahoma City Chamber of Commerce, Dr. Kimball suggested that Oklahoma make more use of its existing intellectual resources and improve its image from the popular wild west dust bowl conception to attract science-based industry.

He said the state's major universities and industries are inadequately involved in the space effort.

"They are not making their proportional contribution to it, nor are they benefiting to any appreciable degree either technically or economically," he said.

Dr. Kimball said that although our universities contain considerable scientific potential, "they are not developing at a rate required to meet the future space needs of the nation."

He said the nation would need at least 160,000 people with doctor's degrees by 1970 when space technology will account for 10 percent of the country's gross national product.

What is actually happening is that because of the space effort, scientists are compressing into one 10-

year period—1960 to 1970—an intensified research program that would normally take 50 years, he said.

Dr. Kimball said one reason Oklahoma is falling behind in industry—and, thus, failing to keep its college graduates here—is that we are unaware of the many findings from the National Aeronautics and Space Administration (NASA) which could be gainfully employed in industrial applications.

Dr. Kimball was here with several other scientists from MRI and NASA observers to tell Oklahoma City business leaders about new commercial products and techniques developed through space research.

Space exploration, he said, has resulted in the development of lighter materials, increasing use of chemicals for applications heretofore considered impossible, new electronics systems, new coatings, and the ability of materials to withstand very high tempera-

tures.

To keep business men and industrialists informed about the commercial applications of space age technologies, Dr. Kimball said MRI has undertaken a three-year action program with NASA, working with both industry and universities. The project is called ASTRA, which means Applied Space Technology Regional Advancement.

He said NASA has given MRI the job of speeding up the flow of technical advances from the space program to industry in Oklahoma and five other midwestern states.

"The project will strengthen the total economic capability of this part of the country by adding a new dimension to our present economy—a dimension based on the science and research which is the key to future growth, both of the firms doing business here and of the economy of the region."

Industrial Future Riding on Egghead

By Gilbert Hill

Oklahoma must recognize the industrial asset of brains and the value of its investment in education if it is to make future industrial progress, Oklahoma City business men were told Friday.

Dr. Charles Kimball, president of the Midwest Research Institute, speaking at the Friday forum luncheon of the Chamber of Commerce, added that "creative thinking is not the exclusive property of scientists and engineers.

The Thinkers

"Some fairly respectable practical concepts have come from philosophers, and from artists like da Vinci and Michelangelo."

Dr. Kimball is here with a team of scientists from the Institute, and observers from the National Aeronautical and Space Administration, to tell Oklahomans about the industrial opportunities to be found in space research.

The Institute has a con-

tract with NASA to conduct a "pilot program" developing "better methods of getting practical information into the hands of those who can use it."

There was a two-hour technical meeting, with slides, graphs and talks, for visiting industrialists during the morning.

But at noon Dr. Kimball was warning the business man that executives whose only scientific knowledge was the difference between metals and plastics "are quite likely to find yourselves left behind in the future."

Experts Needed

He said that the nation would need at least 160,000 persons with doctor's degrees by 1970, only eight years from now. There are now only 80,000 available.

Largely because of space research, "we are compressing within the decade of the 60's an intensified research program which, under normal circumstances, would take 50 years."

These things deal with very high vacuums, cosmic rays, ionized gases, tremendous acceleration forces, high and low temperatures.

Industrial Bait

A state no longer can lure industry with tax exemptions, natural resources, and cheap labor.

Executives in the new "growth industries are not at all interested in cheap labor," he said. "In fact, they want skilled men at almost any price. . . .

"They are not interested in unions. They don't need

freight lines or railroads, or barges. But the one critical requirement they must have is brain power, and since there are no specific regional limitations on brain power" . . . other states are taking up this idea.

Intellectual Air

Dr. Kimball was highly complimentary of the "intellectual atmosphere" which has been created in Oklahoma, "which might be more expected in New England."

He pointed to the Frontiers of Science, Oklahoma City University's Great Plan, graduate work at Oklahoma State University and the University of Oklahoma, as well as the Foundation for Continuing Education at the Kellogg Institute at OU as "important assets for industrial development of the future."

Oklahoma needs to establish the opportunities to keep its investment which it is making in education, he added.

A Great Loss

If Oklahoma loses 100 persons with doctor's degrees it has lost \$50 millions which these men would earn for themselves, plus the new assets they would create in industry, he said.

Pointing to Kansas City, which has brought in about 7,000 top scientists since World War II, he said this annual payroll was in excess of \$60 millions, "and the equivalent of several new manufacturing plants."

A number of those in the area are products of Oklahoma schools, he added.

New Industries

The new industries of the space age, he said include electronics, nucleonics, missiles, computers, chemicals and pharmaceuticals.

During the morning, his team showed Oklahomans a large number of new medicines which have been developed primarily to meet space travel problems. They will have far-reaching implications to American health, including new remedies and methods for finding certain types of heart diseases, tuberculosis, and other maladies.

Dr. Kimball urged that Oklahoma's education be aimed at the needs of the future. He said it should not be confined to the basic sciences.

Example Cited

A Chicago research firm for educational testing of young people grew out of the sociology department of the University of Chicago.

With few exceptions, and despite all the growth in this six-state region, Universities are "inadequately involved in technological effort" because of the failure of mid-westerners to "understand the value of the egghead and how to use him."

Research Brings Business Vast Opportunity, Visitor Says

By Gilbert Hill

Businessmen are "sitting on top of the most fabulous storehouse of scientific information in the history of the world" for development of new industries, new pay rolls and profits, members of the Oklahoma Economic Club were told Monday night.

"This probably will be recognized in history as the age of research on materials for human use," said Dr.

Charles Kimball, president of the Midwest Research Institute, Kansas City.

"There are many new materials. Perhaps more important, we're learning about new ways to process and use many traditional things, too."

The spark driving men forward is the international race to be first to reach the moon—the space age.

However, the same studies that produced a ceramic missile nose to withstand terrific changes in heat and cold brought about a new kind of frying pan.

The effort to make things lighter in weight and more dependable for space travel has turned the "birds nest" of wires and connections behind the dash board of an automobile into a single unit, with a flat, printed circuit.

Early detection of heart disease, drugs for treatment of mental diseases, tuberculosis, and angina pectoris; new and strong films for storage of foods; new methods of making complicated parts with magnetic pulses; new methods of soldering, and the possibility of increasing the life of automobiles, are just a few of the results in the immediate future.

Dr. Kimball admitted that much of the research at present is "buried in scientific papers on library shelves."

But the supply is indicated when it is realized that enough new information is being published to fill seven sets of the Encyclopedia Britannica every day.

More than 800 patents already have been issued, which makes some of the information public with indications of practical applications. And new patents are being issued at the rate of about one a day.

Not the least of the research is aimed at increasing the dependability and lasting qualities of famed American machinery and equipment. The best mechanical equipment of this age must be made to last 5,000 times longer—an automobile would have to go 125,000 miles without service—to qualify for space travel.

Dr. Kimball predicted that "the day of planned obsolescence" and replacement of production facilities may be coming to an end in this country.

The speaker said that the big problem now is "one of communication"—how to get all this information out of the technical realms, and into the hands of practical users.

The Midwest Research Institute, which serves this area, is setting up meetings, publishing bulletins, and is ready to ask NASA what it may know about almost any problem which stumps a business man now.

Expansion Needed

But this area needs expanded scientific activities in almost all of its colleges and universities, and particularly boys and girls who are willing to spend the time and energy to earn their doctorates, so they can translate the scientific findings.

Teams of Midwest scientists now are calling upon colleges and universities in this area, studying their facilities and problems.

Educational executives are being told of NASA aids, for the hiring of highly specialized men to explore specific problems, not only to develop information but to establish better teaching programs in these specialties. Some of the grants run up to \$300,000 for a three-year period.

Gadgets Brought

Kimball had with him a suitcase filled with new gadgets which have developed from space research, but said that "these are only a few," which will be explained more completely at a future meeting in Oklahoma City.

He warned that the midwest had been almost totally passed up during the "atomic age," in the development of new industry because the scientific centers of the country had been along the coasts.

Kimball said that studies of his organization "show a direct relation between contracts let for research" and the resulting new products, and the money which is allotted to educational institutions.

"It makes no difference whether the money for support of educational institutions comes from private sources or taxes," said Kimball, "but where educational money is being spent is where the money goes to find practical uses for knowledge found through research."

THE KANSAS CITY STAR
February 28, 1962

THE EXPANDING ROLE OF MIDWEST RESEARCH.

SOME 18 years ago, a group of businessmen, educators and scientists, concerned about the future of industry and science in this region, gathered here to form the Midwest Research Institute. The group wanted to advance the development of the area as a manufacturing center. They sought to build on what was, at the time, a wartime industrial boom.

Since then, the institute, with solid backing from community leaders, has become a force not only in the Middle West but throughout the nation. In the fields of science, engineering and economics, it has been providing new products and services and acting generally to stimulate commercial growth.

The stature attained by the institute was indicated this week in Washington, when Senator Symington asserted that Midwest Research now ranks 40th in the nation among agencies engaged in defense research and development work. Symington cited its record as an example of how Mid-Western institutions can contribute in a significant manner to the nation's scientific and industrial expansion.

The institute has succeeded, largely because it has had constant support from the community and access to top caliber leadership. In addition, it has managed to attract scientists and technicians of national, and even international, reputation to its staff. But the achievement of Midwest Research need not be unique in the vast Missouri Valley. The formula that has made possible its great success could as well be applied to other institutions of the same type.

Midwest Research, cognizant of its responsibilities to this region, now is attempting to stimulate industrial and scientific progress in the area's universities and manufacturing companies. As part of an agreement with the National Aeronautics and Space agency, institute scientists and economists have been meeting with officials of 19 universities. Their purpose has been to supply information about the national space program that may generate research projects on Middle Western campuses.

Similarly, the institute soon will embark on a series of regional conferences, to explain how area firms can benefit from the nation's expanding space programs. The first such meeting is scheduled to be held later this month in Omaha. Itself a product of Mid-Western ingenuity and dedication, Midwest Research now hopes to alert other regional institutions and companies more precisely to the importance of current trends in science, economics and manufacturing. If its efforts are successful, this could prove in the end to be one of the institute's greatest contributions.

THE KANSAS CITY STAR
March 9, 1962

SPACE AGE WONDERS CAN SPUR AREA INDUSTRY.

"The atomic age passed this area by . . . We cannot expect another opportunity like space technology in our lifetimes, we had better make use of this now or for generations remain a non-industrial area."

THAT kind of warning from Dr. Charles N. Kimball, president of Midwest Research Institute, and similar admonitions from other scientists, this week permeated an unusual regional conference sponsored by the institute and the National Aeronautics and Space administration in Omaha.

As the first of 15 regional gatherings, the session was designed to inform area businessmen of the benefits to be gained from new discoveries in space technology. During the short period that NASA has existed, for instance, some 800 new ideas have evolved, as a consequence of space research. Many of these have been patented.

New materials, products and services growing out of space technology can be of use in numerous ordinary manufacturing enterprises. As an example, a new multi-conductor printed cable developed by Werner von Braun's team at Huntsville, Ala., has been successfully applied to 1962 automotive manufacture. It replaces a conventional dashboard wiring harness that had created installation and service headaches. Many similar cases were cited at the Nebraska meeting.

One of the principal objectives of NASA is to make such information available to manufacturers across the nation, in order to stimulate industrial expansion. Simultaneously, NASA has been co-operating with universities, to strengthen their graduate level scientific programs in science.

The industrial and scientific growth of the Middle West has fallen short of the spectacular advances made by New England and the West coast. Top level educational and research institutions in those regions have spurred commercial development. But this area still has time to benefit from new concepts of the space age. NASA is making an effort to encourage Mid-Western manufacturers. In effect, the nation's space experts are challenging regional businessmen to make the most of a great opportunity. As Dr. Kimball indicates, it would be a tragedy to let such a chance slip away, by default.

OKLAHOMA CITY, OKLA., TIMES
Circ. D. 116,792

MAR 16 1962

Space Business Eyed

A team of scientists from the Midwest Research Institute, Kansas City, will come to Oklahoma City next Friday to confer with industrialists who may be interested in making new products resulting from space research.

The session at the Skirvin Hotel was arranged by the Frontiers of Science Foundation following a speech to the Oklahoma Economic Club Monday night by Dr. Charles Kimball, president of the institute.

Dr. Kimball will head the team and also will be the speaker for the Friday forum luncheon of the chamber of commerce, said E. K. Gaylord, publisher of The Daily Oklahoman and Oklahoma City Times, and chairman of the board of Frontiers of Science.

Any industrialist interested will be welcome at the meeting, and special invita-

tions will be issued to executives of firms that possibly could expand or establish entirely new industries.

Dr. Kimball brought only a few examples of new products and improvements

made on old ones because of space research.

The team coming here will include experts in a number of sciences. They will have printed matter, slides and other data in addition to personal information.